

Docol Hardenable Steel - High Carbon Steel

Cold rolled sheet for quenching and tempering

PRODUCT

Docol high carbon steels are steels which, because of their chemical composition are suitable for hardening, and in the quenched and tempered condition have good toughness at a given strength. The steels are comparable to the standard EN 10132-3.

APPLICATION

Docol high carbon steels are used for applications in which high strength, hardness and wear resistance are necessary, such as wear parts, knives, saw blades, springs, gear wheels, chains, brackets, washers, shoe protection reinforcements etc.

DIMENSION RANGE

Docol high carbon steels are delivered in the following dimensions in the cold rolled and annealed condition.

Thickness (mm)	Width (mm)	
0.80 - 0.99		900 - 1100
1.00 - 2.00	600 - 625	900 - 1250

CHEMICAL COMPOSITION

Steel grade	C (%) min - max	Si (%) max	Mn (%) min - max	P (%) max	S (%) max	Cr (%) min - max	Other min - max
Docol C22	0.17 - 0.24	0.15 - 0.35	0.40 - 0.70	0.025	0.025	0.20 - 0.40	
Docol C35	0.32 - 0.39	0.15 - 0.35	0.50 - 0.80	0.025	0.025	0.20 - 0.40	
Docol C45	0.42 - 0.50	0.15 - 0.35	0.50 - 0.80	0.025	0.025	0.20 - 0.40	
Docol C55	0.52 - 0.60	0.15 - 0.35	0.60 - 0.90	0.025	0.025	0.20 - 0.40	
Docol C60	0.57 - 0.65	0.15 - 0.35	0.60 - 0.90	0.025	0.025	0.20 - 0.40	
Docol C67	0.65 - 0.73	0.15 - 0.35	0.60 - 0.90	0.025	0.025	0.20 - 0.40	
Docol C75	0.70 - 0.80	0.15 - 0.35	0.60 - 0.90	0.025	0.025	0.20 - 0.40	
Docol 42CrMo4	0.38 - 0.45	0.15 - 0.35	0.60 - 0.90	0.025	0.025	0.90 - 1.20	Mo 0.15 - 0.30
Docol 51CrV4	0.47 - 0.55	0.15 - 0.35	0.70 - 1.10	0.025	0.025	0.90 - 1.20	V 0.10 - 0.25

MECHANICAL PROPERTIES

(Approximative values)

Steel grade	Condition	Yield strength $R_{p0,2}$ (Mpa)	Tensile strength R_m (Mpa)	Elongation A_{80} (%)	Hardness HRC	Quenching Temperature (°C)
Docol C22	Annealed	260	470	30	-	
	Water quenched		-		-	
	Oil quenched		-		-	
Docol C35	Annealed	280	510	27	50	840
	Water quenched		1690		47	880
	Oil quenched		1525			
Docol C45	Annealed	330	530	25	55	820
	Water quenched		1980		52	860
	Oil quenched		1795			
Docol C55	Annealed	380	560	24	59	805
	Water quenched		2350		56	845
	Oil quenched		2050			
Docol C60	Annealed	410	570	23	61	800
	Water quenched		2510		58	840
	Oil quenched		2270			
Docol C67	Annealed	440	590	22	64	790
	Water quenched		2760		61	830
	Oil quenched		2510			
Docol C75	Annealed	480	610	21	65	785
	Water quenched		2840		62	825
	Oil quenched		2590			
Docol 42CrMo4	Annealed	400	500	30	55	820
	Water quenched		1980		52	860
	Oil quenched		1795			
Docol 51CrV4	Annealed	450	550	25	61	820
	Water quenched		2510		58	860
	Oil quenched		2270			

BENDABILITY

	Nominal thickness, t $0.8 \text{ mm} \leq t \leq 2.0 \text{ mm}$
Min. recommended bending radius ($\leq 90^\circ$)	1.0 x t

WELDING

Recommended fusion welding methods for Docol high carbon steels include manual metal arc welding (MMA) and gas metal arc welding (GMAW). The steels Docol C22, Docol C35 and Docol C45 can be welded without preheating. For manual metal arc welding of these steels basic electrodes should be used. If it is possible welding should be carried out before hardening.

RECOMMENDED FILLER METALS

Manual metal arc welding (MMA)	Gas metal arc welding (GMAW)
AWS: A5.1 E7018	AWS: A5.18 ER 70S-X

Welding of the other Docol high carbon steels (Docol C55-C75, Docol 42CrMo4, Docol 51CrV4) is not recommended due to the high risk of hydrogen cracks.

The particulars in this data sheet are correct at the time of going to print and are intended to give general guidance for the use of the product. Subject to changes arising from continual product development. The information and data must not be regarded as guaranteed values, unless specially confirmed in writing.



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